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EMRP: Evolutionary-based Multi-hop Routing Protocol for Wireless Body Area Networks

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ABSTRACT

Routing is one of the main challenges in designing wireless body area networks. Existing routing protocols exhibit some drawbacks for practical networks: First, insufficient criteria (e.g., only energy or distance) are used to select the forwarder nodes. Second, controllable parameters of the protocol are determined manually and no automatic tuning is used. Third, the protocol is not adjusted and optimized based on application specifications. In order to overcome the mentioned drawbacks, an adaptive Evolutionary Multi-hop Routing Protocol (named EMRP) is proposed in this paper. We introduce a multi-objective function based on energy level, distance, estimated path loss and estimated energy consumption for selecting optimal forwarder nodes. The proposed objective function aims to select forwarder nodes with high energy, low communication distance, low path loss and low energy consumption. The controllable parameters of EMRP can be adaptively optimized based on application specifications via genetic algorithm. Simulation results show a significant improvement than the existing technologies in terms of lifetime, path loss, throughput, and energy consumption.

Keywords:

Wireless body area networks
Multi-hop routing
Energy consumption
Path loss
Throughput
Genetic algorithm

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